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STUDENT ENGAGEMENT IN SUSTAINABILITY THROUGH DIGITAL MEANS

Faculty of Information Technology and Communication Sciences
M. Sc. Thesis
April 2024

ABSTRACT

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M.Sc. Thesis
Tampere University
Master's Degree Program in Sustainable Digital Life
April 2024

In a world increasingly concerned with sustainability, universities play a crucial role in fostering holistic understanding and engagement in sustainability. However, despite the potential of the digital revolution, university platforms often fall short of facilitating effective engagement. This thesis aims to give a better conceptual understanding of sustainability participation by digital means among university students to enhance their engagement, focusing on Tampere University as a case study.

Through the interpretivist paradigm and qualitative research approach, five Finnish and five international university students were interviewed to explore the main research question: How can student engagement in sustainability be enhanced by digital means? The interview data was analyzed using the thematic analysis method.

The study revealed significant gaps in the usability and accessibility of university digital platforms, showing barriers to effective sustainability engagement. Furthermore, the findings revealed a predominantly narrow understanding of sustainability among students, primarily focusing on the environmental aspects, emphasizing the need for a more holistic sustainability education. While participants demonstrated active engagement in sustainability through various activities, awareness and the use of digital means for sustainability initiatives remained limited. Five key suggestions emerge for universities: ensure accessibility, enhance communication strategies, ensure holistic sustainability education, facilitate cross-disciplinary collaboration, and ensure user-friendly reporting systems. Future research should delve deeper into digital sustainability and evaluate the efficacy of suggested interventions for enhancing student engagement in sustainability.

Keywords: Sustainability, Student Engagement, Digital Means, Accessibility

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

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1 INTRODUCTION

Sustainability has become one of the most pressing issues of this time, and thus an integral part of our lives. It is the pathway to a safe, inclusive, and prosperous future for all. In order to achieve a truly sustainable world, an active engagement of all individuals, organizations, and governments is essential. Universities especially play a crucial role in educating and raising sustainability awareness among their students who are future leaders and decision-makers (Price et al., 2021; Rieckmann, 2012). Yet, the engagement of university students remains understudied. And for many, just like for Tampere University in Finland, student engagement (or the lack thereof) in sustainability remains a challenge.

Today, digital technologies shape all areas of our lives and impact immensely the development of the whole society (Hülür & Macdonald, 2020; Osburg & Lohrmann, 2017). The digital revolution led to a change in the way we communicate, learn, and work (Keegan, 2012). It also created new opportunities for engagement in sustainability by making it easier to share information and collaborate. To unlock the full potential of this digital paradigm shift in education, it is crucial to ensure that the tools universities use are accessible (Fajardo-Flores et al., 2021; Máñez-Carvajal et al., 2021). There is no doubt that a new need to explore how universities and their students can use digital tools to engage in sustainability emerged. Tampere University serves as the empirical case study in this thesis.

In this context, the thesis aims to give a better conceptual understanding of sustainability participation by digital means among university students to increase their engagement. It will explore the existing literature to conceptualize and define what sustainability means and give an insight into how university students engage in sustainability in the context of digital society. The main question the thesis at hand aims to answer is: *How can student engagement in sustainability be enhanced by digital means?*

The research of this thesis was conducted in two stages. The first stage, consisting of preliminary data, was a user study conducted in collaboration with the students of the HTI.310 Methods in Human-Centered Design course. In the second and main stage of the research process, qualitative interviews with university students were conducted and

the main data of the thesis at hand were obtained. At the end of the interview process, prototype testing of a digital form was conducted which offered complementary data for Tampere University as a collaborator of this thesis. An interpretivist paradigm was employed to capture the lived experiences and subjective perspectives on the sustainability engagement of the participants. To identify and assess reoccurring themes and patterns of the interview data, thematic analysis was employed.

The thesis at hand begins with a literature review where the main concepts are explored. These include the definition of sustainability, student engagement in sustainability, and accessibility in student engagement. Chapter 3 describes the research methodology, encompassing online interviews, and thematic analysis. Next, the findings of the thematic analysis are described in chapter 4. Chapter 5 discusses the main findings and chapter 6 presents the ethical aspect of the study. Finally, chapter 7 concludes the thesis by summarizing the aim and findings of the study.

2 SUSTAINABILITY IN HIGHER EDUCATION

In this chapter, the main concepts are examined and defined, which creates a theoretical framework for this thesis and research.

2.1 Definition of sustainability

First, it is crucial to explore how has sustainability been defined and understood. One of the most used definitions of sustainability is by the UN Commission on Environment and Development (1987), which defines it in their Brundtland Report as „*development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs*”. As a holistic concept, sustainability takes into consideration three fundamental dimensions: environmental, social, and economic. These have been denoted as the pillars of sustainability and reflect the fact that responsible development involves a balance between the planet, people, and profits (Elkington, 1999; Kajikawa, 2008; Schoolman et al., 2012). This famous concept is also known as the Triple bottom line. Arguments challenging the definition have been raised, one of them being that economic growth is not suitable due to its negative impact on natural resources and the deterioration of the environment (Spaiser et al., 2016). Through the years, various authors have also noted that more dimensions, such as health, are missing and should be incorporated into the sustainability definition as well (Kajikawa, 2008 & T. Olsen, personal communication, January 20, 2022).

Today, digital technologies shape all areas of our lives and greatly impact the development of our society. It seems clear that the definition of sustainability should be adjusted and enriched by the digital aspect. Sustainability and digitalization have been examined separately in a significant amount of recent literature. However, research on how these concepts intertwine and impact one another receives less attention.

Bohnsack et al. (2021) argue that the digital age blurred the boundaries of the triple bottom line and exceeds the dimensions of sustainable value. Both deliberate and unintended consequences of digital technologies on sustainable development are examined and the authors demonstrate their relation in an organizing framework. It is concluded that it is crucial to understand the concept of sustainability in the digital age to prevent breaching the planetary boundaries further (Bohnsack et al., 2021).

Another study, conducted by Palacká et al. (2021), maps the opportunities and benefits for sustainability issues of companies. The authors define digitalization and

sustainability separately. The authors perceive sustainability from a quite short-sighted perspective, where only the environmental aspect is accounted for. Although the authors note that rethinking and redefining sustainability within the concept of the digital era is needed (Palacká et al., 2021), they do not present a new definition.

Seele and Lock (2017) in their paper examine what opportunities, risks, and pathways can the digital era bring for sustainability. They refer to digitalization as a “game-changer” for sustainability and argue that sustainability is expected to adapt to the fast digitalization, or digitalization will itself drive the changes in sustainability. Various perspectives on sustainability and digitalization are mapped, and it was concluded that the research is still in its early stages on many levels, including conceptual, political, scientific, or technological aspects. (Seele & Lock, 2017) Overall, it can be concluded that the current literature is still lacking adequate conceptualization of sustainability in the digital age.

2.1.1 Sustainable Development Goals (SDGs)

Next, the focus falls on the Sustainable Development Goals, which provide a valuable outline for companies, industries, and countries to achieve a better and more sustainable future (Robert et al., 2005). Although imperfect (Spaiser et al., 2017), they define what specifically needs to be achieved which is a good starting benchmark for any organization to follow.

The Sustainable Development Goals of the 2030 Agenda for Sustainable Development are presented as the outline for all to achieve a better and more sustainable future, addressing many global challenges. The 2030 Agenda was adopted in September 2015 at the UN Summit in New York and sets out a 15-year common plan for all nations of the world. It includes 17 Sustainable Development Goals, also known as Global Goals, that were created to reduce poverty and discrimination, protect the planet, and strengthen freedom, security, and prosperity globally. (United Nations, 2015) The 17 goals include a total of 169 targets that are tracked by 232 unique indicators (Ritchie et al., 2018).

The 2030 Agenda, also referred to as comprehensive, universal, people-centered, or transformative (Swain, 2017), has received criticism as well. According to the International Council for Science (ICSSU), the SGDs lack internal consistency, which

makes them unsustainable as well (International Council for Science and International Social Science Council, 2015, cited in Spaiser et al., 2017).

Spaiser et al. (2017) focused on the investigation of potential contradictions in the SDGs to support the concern of ISSCU. The results of their extensive analysis revealed that “economic growth fulfills socio-economic goals while simultaneously hindering environmental goals”. However, areas like health and government spending do not trigger the conflict among SDGs that are incompatible with each other. The SDGs have also been described as “difficult to qualify, implement, and monitor” (Swain, 2017). Furthermore, since the goals are non-binding, countries are expected to develop their own domestic and regional strategies to achieve them (Swain, 2017). Swain (2017) identifies the scarcity of data as a significant obstacle to monitoring the SDGs, moreover, states that SDGs are not based on a comprehensive theoretical framework.

Just like Spaiser et al. (2017) suggest, it needs to be acknowledged that the 2030 Agenda is a future-oriented plan that has and may still face many unforeseen turns along the way. Especially in our digital era, technologies on one hand enable us to achieve some goals faster and more efficiently, on the other may cause negative effects on some areas of sustainable development. Either way, it is crucial to explore solutions and proceed with the plan of achieving sustainable development the best we can, rather than wait for technological innovations in the future.

To conclude, there are a few studies that assess and examine digital technologies in relation to sustainability from various perspectives. However, the general definition of sustainability in the digital age is somewhat missing from recent literature. The definition of sustainability, as described in this thesis, is based on research from the gathered literature and the author's own understanding and can be summarized as follows. Sustainability is an ever-evolving process and development of all aspects of life that does not hinder the life and development of future generations. Furthermore, sustainability enhances collective well-being and prosperity. It is a symbiosis, coexistence, and collaboration of human, non-human, and digital systems and cultures.

2.2 Student engagement in sustainability

As the main aim of the thesis is to understand student engagement in sustainability, “lack of student engagement in sustainability” “student participation in sustainability” or “perception of sustainability AND students” were searched. Most studies were

focused on the environmental perspective, and then on education. The results on student perception of sustainability were mostly environmentally and regionally focused. Studies were made within fields like urban development, architecture, and other study programs.

The results of Alexander et al.'s (2022) explanatory analysis show that campus community members from two higher education institutions in the USA often view sustainability from an environmental lens. The authors also define “sustainability culture in higher education” as beliefs, values, and shared assumptions that develop over time with the organization and underline the behaviors among the campus community members. The findings suggest that individual interpretations of sustainability can influence how campus sustainability culture elements are perceived. Furthermore, participants with a more comprehensive understanding of sustainability anticipated elements associated with the social aspect of sustainability at a significantly higher rate compared to those with a narrower definition of sustainability. (Alexander et al., 2022)

García-González, Jiménez-Fontana & Goded (2020), though focused on the perspective of training future teachers, examined the perception of students from master's degree programs in Education. They examined their understanding of the concept of sustainability and today's social and environmental challenges. The results of their analysis showed a surface-level perception of sustainability in the context of an environmental perspective, reflecting the lack of knowledge and deeper understanding regarding social and economic aspects.

When it comes to student participation in sustainability, the recent literature contains very few relevant studies. Murray (2018) presents a systematic literature review examining existing research on student-led initiatives for sustainability in higher education (SHE). The author notes that universities have, over the past decades, been recognized as key drivers in fostering the development needed to support the transition of sustainable societies. Students form a significant stakeholder group, yet their sustainability actions remain understudied. Despite this fact, there is a growing trend focusing on student involvement. The findings imply that students are actively involved in enhancing the uptake of sustainability in higher education through multi-stakeholder collaborations, collective action, and interdisciplinarity approaches. However, a lack of

consideration for intersectionality (intertwined social and environmental aspects) was identified. (Murray, 2018)

Maiorescu et al. (2020) present an analysis of sustainable university and Education for Sustainable Development (ESD) challenges. Then, it examines the students' perception of ESD and other barriers to sustainability, as well as their attitude and motivation for behaving sustainably within their university. The results indicate that students perceive their lack of engagement as the main obstacle to the sustainable development of their university, rather than the lack of management strategy of the university. Another factor acting as a barrier and leading to low involvement of students in general, is the lack of sustainability-oriented education within the institution, both at the theoretical and practical level. (Maiorescu et al., 2020)

The next study conducted by Carbach and Fischer (2017) examines sustainability reporting as a newly emerging practice within the educational sector. Research with an explanatory approach was conducted at three innovative schools in Germany that have initiated the implementation of sustainability reporting mechanisms. The findings suggest that sustainability reporting at schools can contribute to increased student participation in sustainability activities. (Carbach & Fischer, 2017)

Another study focusing on the topic of reporting is by Schoeps and Hemmer (2017). Their research aimed to examine the partaking in the writing of an annual sustainability report published by the University of Eichstaett-Ingolstadt and gain insights into possible improvements in students' participation in sustainability actions. Their explorative, qualitative study shows various student perceptions indicating productive participation, such as students feeling prepared from their previous experience and education. The students' motivation stemmed from diverse sources, one of which was a strong interest in the university's sustainability initiatives. Engaging in the report writing process has, according to the participants, benefited students in multiple ways. On the other hand, less motivation and ineffective student participation were linked to a lack of support and collaboration within the university regarding data collection and information gathering. From the researchers' point of view, students must be aware of what they can expect from participating in the writing of a report, to ensure their involvement. (Shoeps & Hemmer, 2017)

In a study conducted by Chambers et al. (2019), the impact of the Young Persons' Plan for the Planet Program, an experiential learning tool based on strategic planning, was examined. The program aimed to enhance students' abilities in comprehending and promoting the SDGs. The results indicate that students who participated in the International Conference in Mauritius demonstrated significant improvements in understanding, attitudes toward SDG awareness, motivation, and empowerment. The authors highlight that their research shows the significance of education in effectively engaging, connecting, and empowering young individuals to actively contribute to the achievement of the UN SDGs and sustainable outcomes. (Chambers et al., 2019)

In the context of this thesis, student engagement is defined as student involvement and the level of participation in sustainability activities and initiatives, especially through digital means. There are several dimensions to this definition, including student willingness to collaborate with others in sustainability projects, to learn more about the concept and practices, or to adopt sustainable behaviors. As indicated in many studies, engagement in sustainability is linked to the understanding of it, thus the definition also encompasses students' perceptions, values, motivations, and attitudes toward sustainability initiatives and activities.

2.2.1 Accessibility in student engagement

The fast digitalization, which was also boosted by the COVID-19 pandemic, has led to a paradigm shift in the education system (Haleem et al., 2022; Máñez-Carvajal et al., 2021). Universities are using more and more digital tools to communicate and interact with their students. Furthermore, it creates more opportunities for students to engage in sustainability. It is essential to ensure that these tools are accessible to all, regardless of their abilities (Cifuentes et al., 2016). Yet, many studies conclude, that university websites and platforms lack in their accessibility aspects (Máñez-Carvajal et al., 2021; Ismail et al, 2020).

Defining accessibility remains a challenge due to its complexity and the multitude of aspects that need to be considered. However, accessibility can be defined, in simple terms, as granting people with disabilities or any special needs the opportunity to participate and enjoy life, engage in different interactions, and acquire the same information as people without special needs and disabilities. It is a way to erase barriers and include and integrate people who are often excluded or even discriminated against.

Accessibility helps people with special needs and/or disabilities obtain information with ease and as independently, equally, and as fully as people without these special needs and/or disabilities can (Disability Resource Office, 2022).

For this thesis, the focus falls on digital accessibility as one of the crucial factors for student sustainability engagement, which refers to ensuring that the tools and platforms that the university is using and providing for its students are designed in such a way that they are usable by all students, regardless of their abilities. This can be accomplished by following universal design principles. These are defined by the Centre for Excellence in Universal Design CEUD (n.d.) as follows:

1. **Equitable use:** Design products and environments that are usable and marketable to people with diverse abilities, ensuring equal access and usability for all users.
2. **Flexibility in use:** Accommodate the diverse needs and preferences of individuals by providing various usage methods and adapting to users' pace and preferences.
3. **Simple and intuitive use:** Ensure that design is easily understandable regardless of language skills or experience level or user, eliminating unnecessary complexity and providing effective prompts.
4. **Perceptible information:** Effectively communicate essential information to users, using multiple presentation methods and maximizing legibility and contrast.
5. **Tolerance for error:** Reduce risk and potential negative outcomes resulting from unintentional actions, providing warnings and fail-safe features to mitigate errors.
6. **Low physical effort:** Design products and environments that are efficient and comfortable for the user with minimal physical exertion, minimizing repetitive actions, and sustaining physical effort.
7. **Size and space for approach and use:** Ensure accessibility for all users by offering appropriate size and space for approach, reach, and manipulation regardless of their body size or mobility. (CEUD, n.d.)

Some digitally accessible features include, for example, providing alternative formats, simple language, transcription or closed captioning, alternative texts, etc. (Cifuentes et al., 2016).

2.3 Conclusion

The research indicates that the definition of sustainability lacks the positioning within and perspective of the digital age. Though there is extensive research on digitalization and sustainability separately, their relation is still missing from the current literature. The Sustainable Development Goals, though imperfect, provide a valuable outline for striving toward a better and more sustainable future.

When it comes to student participation in sustainability, most of the literature covers mainly environmental sustainability, and there is a lack of focus on the social and economic aspects of the concept. Various authors concluded that sustainability education and awareness increase the motivation and engagement of students in sustainability action. Furthermore, it was found that sustainability reporting at schools can contribute to increased student participation.

As more opportunities to use digital tools in sustainability engagement emerge, it is essential to ensure that these tools are accessible to all regardless of their abilities. The university can ensure that its tools are accessible by following accessible design principles and implementing accessible features like alternative formats, transcriptions, plain language, or incorporating multiple languages.

To help answer the main research question *How can student engagement in sustainability be enhanced by digital means*, the following themes were identified:

Concept	Reference
Digital means and accessibility	Haleem et al., 2022; Máñez-Carvajal et al., 2021; Ismail et al., 2020; Cifuentes et al., 2016
Sustainability understanding	Alexander et al., 2022; Chambers et al., 2019; García-González et al., 2020
Engagement in sustainability among university students	Carbach & Fischer, 2017; Murray, 2018; Shoeps & Hemmer, 2017

Table 1: Conceptual framework for studying how university students engage in sustainability by digital means

Firstly, the university's digital tools and their accessibility need to be explored. That is to find out what is the student's digital life in general in relation to the university. Next, the understanding of sustainability, which has been found to be linked to their motivation and engagement, needs to be assessed. The third concept is student engagement in sustainability, including sustainability reporting and preferred way of

engagement, which helps determine, how the university can increase student engagement in sustainability.

3 METHODOLOGY

Collaboration with industry partners and institutions is an integral aspect of the master's degree program in Sustainable Digital Life at Tampere University. The thesis at hand arose from an opportunity to collaborate with Tampere University on a project described in this chapter.

Tampere University, located in the third-largest Finnish city Tampere, was established in 2019 as a merger between the Tampere University of Technology and the University of Tampere. However, the roots of the University of Tampere can be traced back to the Civic College founded in Helsinki in 1925, which was moved to Tampere in 1960 as the School of Social Science and renamed to University of Tampere six years later (Archinfo Finalnd, n.d.). Tampere University is considered one of the most multidisciplinary universities in Finland, as it brings together research and education in health, society, and technology. With its seven faculties and three campuses it hosts a community of over 4 000 academic staff and over 22 000 students from all over the world. (Tampere University, n.d.)

Tampere University is committed to sustainable development and has taken numerous initiatives to boost sustainable practices in the use of its facilities as well as in the daily activities of its community. Such include, for example, promoting green transportation, recycling, reducing energy consumption, and supporting the well-being of its students. (Tampere University, n.d.)

The wicked problem of Tampere University was identified as the lack of interest in sustainability matters among students, which results in a lack of engagement and overall sustainability action. Due to the broadness of this issue, the problem was narrowed down to the lack of participation in the creation of the Tampere University Sustainable Development Report.

The Sustainable Development Report serves to showcase the work of the Tampere Universities community and thus offers information about their activities to promote social, cultural, environmental, and economic sustainability (Broman & Nurminen, 2021). The Sustainable Development Report 2020, published in 2021, is the first of its kind which indicates that it is still a work in progress. The United Nations' Sustainable Development Goals (SDGs) were chosen as a framework for the reporting. The authors of the report recognize that the classification of activities under the SDG categories is

artificial and very simplified for clarity. The reasoning behind these steps can be found in the lack of knowledge of the SDGs among the Tampere University community and the hardship of identifying the right SDG category, as the described activities usually impact multiple SDGs. (Broman & Nurminen, 2021)

The research of this thesis was conducted in two stages. The first stage, consisting of preliminary data, was a user study conducted in collaboration with the students of the HTI.310 Methods in Human-Centered Design course. This user study provided foundational insights into sustainability understanding and students' capacity for sustainability engagement and served as a basis for creating a digital form prototype. In the second stage of the research process, qualitative interviews including prototype testing of a digital form with university students were conducted and the main data of the thesis at hand were obtained. This phase offered deeper insights into the sustainability understanding among university students, and their level of engagement both in general and within the university community, as well as within the digital realm. This stage also explored students' preferred engagement in sustainability, thus providing suggestions on how the university can enhance student engagement. At the end of the interview process, complementary data were gathered through simple prototype testing. This complementary data offered additional context and validation to the author and the findings were shared with Tampere University as the collaborator of this study. The research process is illustrated in Table 2 below.

Stage	Form	Number of participants	Role in this study
Stage 1	User study	4 participants	Preliminary data for creating the prototype form (not public)
Stage 2	Qualitative interviews	10 participants	Main data of this study
Stage 2.1	Prototype testing	10 participants	Complementary data for the collaborator (not public)

Table 2: Research process

This process provides insight into how students understand and perceive sustainability, what sustainable activities they already engage in, what university tools they use, and if they consider them accessible. Data from the research is of importance

for increasing student engagement in sustainability and developing a sustainability agenda at the university in an effective way.

Part of the solution delivered to Tampere University is a digital form designed to help with the data gathering from university students. Such a solution, if communicated well, can distinctly increase participation in not only reporting but also in overall sustainability action. Until now, the data has been gathered via email and without a structure, resulting in a low response rate and a time-consuming process of rewriting the information. This digital form offers a semi-automated format of reporting that can shorten the time needed for the formatting and classification of the data. The form includes an educative element, that will inform the students about the SDGs and help them categorize their sustainability actions.

3.1 Research approach

As the main goal of the research is to understand and describe students' lived experiences and explore their subjective perspectives, an interpretative approach is employed. Interpretivism is grounded in the understanding that there exist multiple socially constructed realities, which are influenced and shaped by the individual's lived experiences. In this approach, truth is context-dependent, no values are considered wrong, they can only be different. (Kawulich, 2012; Chilisa, 2011)

The interpretivist framework allows for an in-depth exploration of how students perceive sustainability and engage in sustainable activities. It recognizes the subjective and unique perspectives, challenges, and motivations of individuals within their social environments. This approach aligns with the research aim of gaining a better conceptual understanding of sustainability engagement among university students.

To achieve the objective of this research, qualitative research methodology is utilized, primarily employing online qualitative thematic interviews for data collection. Qualitative methods are well-suited for capturing diverse perspectives of participants as they are intended to generate knowledge grounded in human experience (Sandelowski, 2004). As such, this research seeks to generate insights into student understanding and engagement within sustainability and through digital means.

The combination of qualitative interviews and thematic analysis allows for an in-depth exploration of the perspectives, experiences, motivations, and challenges faced by university students in their sustainability engagement within the digital society.

3.2 Thematic interviews

The interview questions were formulated based on the themes that emerged from the literature review, thus consisting of three themes:

1. Digital means and accessibility
2. Sustainability understanding
3. Engagement in sustainability (inc. sustainability reporting and suggestions on how the university can enhance student engagement)

While each of the above-identified themes consisted of a certain set of questions (Appendix A), the interviews were semi-structured, and the questions were open-ended, descriptive, and non-directional. This approach allowed for more flexibility in the answers which were further informing the research process. (Kawulich, 2012)

The interviews were conducted online, which allowed for more flexibility and comfort for the participants. Furthermore, it created a more accessible experience as there was a need to share links, websites, and testing of the prototype – an online form. A purposeful random sampling strategy was used to increase the credibility of the results (Palinkas et al., 2015) and to select a diverse range of university students. The sample consisted of ten participants, chosen based on their availability and willingness to share their perspectives and experiences.

At the beginning of each interview, an informal welcome took place to create a safe and open atmosphere. Following this, the interviewer asked for consent to record the interview. Participants were then informed about the content and purpose of the interview and asked for vocal consent for participation. Participants were also notified about additional resources in the form of links and online websites and thus asked whether they were comfortable with the use of different Microsoft Teams functions. All ten participants had previous experience with the platform and virtual meetings.

The interviews were conducted in the period from 10. 10. 2022 to 12. 12. 2022. They were conducted online in Microsoft Teams, and each lasted approximately one hour. The participants were reached through social media channels and interviews were agreed in advance. The themes and questions of the interview were not disclosed in advance.

3.2.1 Participants

The research participants are listed in Table 3 below. To ensure participants' confidentiality, the study anonymizes any personal information of the participants. However, in order to provide insight into possible similarities and differences in participants' perspectives, the study field/program is revealed. They will be referred to with a code that consists of:

- “P” as participant and the number of participant (1-10)
- “F” or “I” which indicates whether a participant is Finnish or international
- “m” or “f” indicates the gender of the participant (male or female)

The total of ten participants consisted of five international students, all from Europe, and five Finnish students. Selecting equal representation of Finnish and international students added a cross-cultural dimension to the study. The gender balance of four men and six women further contributed to the representativeness of the sample. Most participants were students of a master's program, except for one bachelor student. Although the field of study is not reflected in the code nor in the analysis, the author intended to choose a sample from diverse study fields to provide a more comprehensive understanding of the research topic. This diversity ensured a broad range of perspectives and experiences.

Code	Study field	Nationality	Gender
P1_Fm	Knowledge Management (master's program)	Finnish	male
P2_Ff	International Relations/Political science (master's program)	Finnish	female
P3_Fm	Education Studies (master's program)	Finnish	male
P4_Ff	Computer Science (bachelor's program)	Finnish	female
P5_Ff	Public and Global Health (master's program)	Finnish	female
P6_Im	Human-Technology-Interaction (master's program)	International	male
P7_If	Leadership for Change (master's program)	International	female
P8_If	Game Studies (master's program)	International	female
P9_Im	Safety and Security Management (master's program)	International	male
P10_If	Public and Global Health (master's program)	International	female

Table 3: List of participants

3.2.2 Prototype testing as part of the interview

In addition to qualitative interviews, simple user testing with a prototype of a digital form was implemented. The testing helped gather complementary insights into the user experiences and aimed at improving the data collection process for the Sustainable Development Report of Tampere University. The methodology draws upon the principles of Human-Centered Design.

In Human-Centered Design, the end user is placed at the core of the design process with the emphasis on involving them through the whole design process. Its goal is to increase the usability of the system in order to create the best satisfaction for the user and increase the safety performance of the system. (Harte et al., 2017) This approach offers several benefits, such as enhanced productivity, greater accessibility, and improved user well-being (International Organization for Standardization, 2010). Usability testing, as a key component of Human-Centered Design, aims to evaluate the user experience and usability of the system. In this context, the prototype form serves as a representative artifact of the data collection process.

The prototype form was based on a user study conducted in collaboration with the students of the HTI.310 Methods in Human-Centered Design course. At the end of each interview, the participant was introduced to the prototype form and its purpose. They were provided with a link to the online form and had time to explore it at their own pace. They were encouraged to test the form by filling it in with true or false information which was optional. This approach ensured a comfortable and non-intrusive testing environment. After the exploration phase, participants were asked a series of questions, such as what their overall opinion of the form was, how they would suggest making it better, and whether they found it accessible. These questions aimed to gather constructive feedback and suggestions for improving the form.

The user testing with the prototype was conducted to provide deeper insights into the user experiences of the participants which were shared with Tampere University as the collaborator of this study. This process helped identify areas for improvement and refine the form for effective data collection in the context of the Sustainable Development Report of Tampere University.

3.3 Thematic Analysis

As the primary method of data analysis, thematic analysis is used. Some authors have stated that thematic analysis should not be considered a qualitative method, as it is rather a process that assists researchers in analysis (Ryan & Bernard, 2000; Holloway & Todres, 2003). Others (Braun & Clarke, 2006; King, 2004; Nowell et al., 2017) have claimed thematic analysis to be a qualitative research method on its own, and as such, it is used in this thesis.

Thematic analysis is a method that involves identifying, examining, organizing, and reporting themes found within collected data (Braun & Clarke, 2006). This method allows for the exploration of perspectives of different participants, reoccurring ideas, and experiences related to sustainability engagement among university students.

The analysis process begins with familiarization with the data which started already during the online interviews where the author had the first contact with the data in real time. Next, to review the data and prepare them for analysis, the data was transcribed into text. The first transcription was done automatically via the Microsoft Teams platform during the recording process. Each recording was listened to at least once, and text transcriptions were corrected and cleaned from pauses and filler words. Transcripts were reviewed multiple times during the analysis.

Next, initial codes were created in the Microsoft Excel platform. Transcripts from all ten interviews were arranged within the interview framework on multiple sheets in Excel. Once information from the transcripts was aligned with the interview framework, responses were reviewed and analyzed to identify patterns among them. These were highlighted within each question in different columns of the sheet. Next, the emerging themes were identified by highlighting commonalities and patterns with colors. These themes were then reviewed and interpreted to provide a comprehensive understanding of how university students engage in sustainability and their use of university digital tools. Quotations from the data were extracted to support the findings.

4 FINDINGS

In this chapter, findings are presented. These are derived from the thematic analysis of qualitative interviews conducted with Tampere University students defined in the previous chapters.

4.1 Digital Means and Accessibility

The first concept identified through the literature review (Haleem et al., 2022; Máñez-Carvajal et al., 2021; Ismail et al., 2020, Cifuentes et al., 2016) is Digital Means and Accessibility. The exploration of the concept was divided into three parts during the interview: (1) which university platforms participants use the most, (2) how accessible they find the university websites, and (3) their general experience with questionnaires and forms. These findings provide a better insight into how students are using the digital tools of the university.

The platforms used by participants can be seen in the chart below.

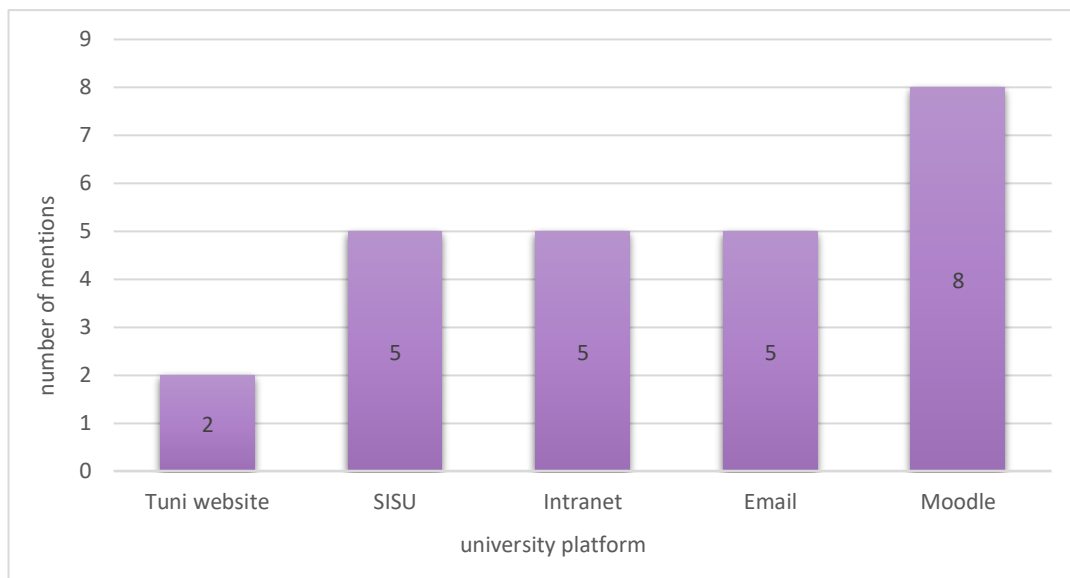


Chart 1: University platforms used by participants

Out of these platforms, the most used as a communication channel is email, followed by Moodle. This can be attributed to the familiarity with these tools and ease of use for both students and university staff. When asked, what digital means they would use to share information with the university, most participants would contact professors or university staff directly via email and ask for more guidance. Two participants mentioned posting on the university Intranet, although expressed uncertainty about how to do it. This finding may suggest a potential threat to student

engagement due to unfamiliarity with the features of the platform. Only one participant (P1_Fm) mentioned contacting a student association representative.

When it comes to obtaining information about events and other university activities, participants find the Intranet newsletter the most useful. Other means like email, social media, the website of the university, or communication from student associations were mentioned. It is important to note that although the Intranet newsletter was found to be most useful as a means of getting information, many participants do not visit the Intranet website directly but rather via links in the Intranet newsletter they receive to their emails. This finding may suggest that the accessibility of the platforms impacts their usage (Máñez-Carvajal et al., 2021).

Four participants claimed the university platforms to be inaccessible, and issues with navigation and search were mentioned. This finding is consistent with previous research identifying a lack of accessibility in university platforms (Máñez-Carvajal et al., 2021; Ismail et al, 2020):

P1_Fm: *"I avoid using [Intranet] because the navigation is so, so bad."*

P3_Fm: *"Doing a search on the [university main] website I'm not sure if it's ever really been successful..."*

P3_Fm: *"So the [university] website I don't find it to be very intuitive, very helpful."*

P4_Ff: *"--in Intranet I think almost every time I end up lost in there."*

P9_Im: *"I have been actually trying to avoid [university webpages] because they are quite hard to navigate and usually googling for the stuff that I need is much quicker..."*

Six remaining participants stated that the university platforms are accessible, however, three proceeded to point out their challenging experiences with navigation or finding information. This may indicate a lack of understanding of the accessibility concept. One of the participants (P6_Im) considers them to be accessible, however, does not use the university platforms to find out information and rather accesses them via direct links or Google search.

When asked, what could be improved regarding accessibility, the optimization of the search was mentioned the most, followed by the consolidation of different platforms into one for better clarity and easy access, and better communication from the university.

Finally, participants were asked about their general experience with questionnaires. Among the most mentioned reasons why participants skip or decide not to fill in a questionnaire at all was the length of the questionnaire, or the excessive number of open-ended questions. The relevance of the questionnaire to the participants' interests or knowledge and the purpose for providing the answers also influence their decision. For example, P5_Ff mentioned: *"If I start and then I realize that it's not that relevant to me or my answer doesn't really contribute much, then I might just like stop."* Participant P6_Im expressed the importance of the added value: *"I tend to do [them] because I know that this is for the future of other students, and I know that this can have a direct impact."*

One aspect that was mentioned by multiple participants was adding sections and a way to track the progress or time until completion of the survey. Lastly, participants find the questionnaires generally well accessible, pointing out multiple language options (translation) as particularly important.

4.2 Sustainability understanding

The second concept that emerged through the literature review (Alexander et al., 2022; Chambers et al., 2019) is sustainability understanding. The concept was explored in two parts during the interview: (1) how do participants understand and define sustainability and (2) what is their knowledge about the Sustainable Development Goals (SDGs) of the United Nations.

Firstly, participants were asked to explain their understanding of sustainability, then they were encouraged to name examples of sustainable actions. This helped get a more comprehensive overview of their understanding. Various key concepts were mentioned, including environmental aspects, economic sustainability, and social considerations. The digital dimension was mentioned by only one participant. Apart from these main themes, many expressed the importance of being aware of one's actions and choices or being thoughtful toward the future. Examples of sustainable actions

mentioned by participants related to various aspects of life, from diet or transportation considerations to energy use and responsible use of finances.

The most common theme across the responses was the environmental aspect of sustainability, mentioned by eight participants. These findings are consistent with the previous research highlighting the dominance of the environmental aspect of sustainability (García-González et al, 2020; Murray, 2018). Some participants emphasized that the environmental aspect of sustainability is the first thing that comes to mind:

P10_If: *“I think right away about climate change or the climate.”*

P3_Fm: *“To me, sustainability is green values and Carbon footprint ... obviously for me I think of climate change and ecological issues first...”*

The participants highlighted the need to address climate change and ecological issues, as well as the importance of reducing energy consumption, minimizing waste, and reusing resources. Among examples of sustainable actions participants mentioned vegetarian and vegan diets, limiting plastic use and recycling, or choosing an environmentally friendly means of transportation.

Some participants also recognized the social dimensions of sustainability, highlighting the relevance of societal matters and social issues. P2_Ff stated that sustainability is so much more than green issues: *“I would say that it also then covers all the social issues and societal matters in general.”* Participant P3_Fm highlighted various aspects that would make a company unsustainable: *“--- a bad working environment. And miscommunication and bad human relations ...”* It is noteworthy that the participant, although naming practices related to the social aspect of sustainability, considered it the economic dimension. Participants defined sustainability also as a lifestyle in which responsible choices benefit the environment and broader community. P2_Ff explained: *“doing things in a way that thinks about the future. It's something that doesn't take into account only this moment, but also what comes later.”* Examples of sustainable actions included responsible shopping habits and support for businesses that positively impact the community.

Another theme that emerged was the economic aspect of sustainability. Participant P3_Fm acknowledged that the definition of sustainability might vary for

individuals and companies. While for them, sustainability is linked to climate change and green values, sustainability for companies can mean the overall functioning and longevity of their operations: “...to make [a company] sustainable they might think ..., economically sustainable or just ... It's a functioning company. “ P9_Im expressed a similar opinion: “A sustainable business doesn't necessarily have to mean that it will be ecological or climate-friendly. It just means that it will start and it will exist after a certain amount of time. “ Among examples of sustainable actions in the economic dimension, participants mentioned making sustainable choices with their finances or supporting local businesses while considering the economic impact of their actions.

Some participants defined sustainability from a more general level, for example, participant P7_If noted: “I understand it as a super general concept that cannot be basically defined because it entails many behaviors, but also at the same time understanding of the environment and also some normative aspects. ... an approach ... that you can have towards yourself. What you eat, what you study, how you behave everywhere and all the time.” Others defined sustainability from the perspective of awareness about one’s actions and thoughtful behavior:

P2_Ff: “... it's doing things in a way that thinks about the future ... Just trying to live in a way that is aware.”

P4_Ff: “... using physical or digital stuff without it harming people, animals or the environment.”

P5_Ff: ” ... a lifestyle where you are able to make decisions that benefit the planet and our environment... making choices that you feel like are beneficial for not only you but also the environment.”

P6_Im: ” ... being thoughtful about the resources you use and looking for better alternatives always.”

4.2.1 Sustainable Development Goals

Next, the participants’ knowledge of the Sustainable Development Goals (SDGs) of the United Nations was explored, and it varied significantly. Some participants (P1_Fm, P6_Im) indicated very limited familiarity with the goals, while others showed a more comprehensive description and understanding of the themes covered by the SDG Agenda. For example, P7_If explained: “There are 17 sustainable goals and those are

to be achieved from each country for 2030 and they range from food to studies for accessible for all people to economy to water access, they are very broad.” It is noteworthy that participants who displayed limited knowledge of the agenda assumed it covered topics like carbon neutrality or lowering emissions. These findings yet again align with previous research highlighting the dominance of environmental knowledge within the sustainability concept (García-González et al, 2020; Murray, 2018).

Most participants were able to name certain topics covered by the agenda, including poverty, hunger, education, health, or climate action. This indicates a general recognition of the interconnectedness of different aspects of sustainable development. The participants acknowledged both environmental and social aspects, while less than half of the participants mentioned the economic dimension. Furthermore, while some participants focused on different themes covered by the agenda, others had a broader overview of the goals, as can be seen from the answer of P5_Ff: *“It's a set of goals set by the United Nations to try and complete by 2030, which are meant to improve sustainability and overall like health and well-being of the world.”*

While some participants expressed appreciation and optimism towards the SDG agenda, some exhibited skepticism about the achievability of certain goals. For example, P10_If mentioned: *“Some of the development goals are not really reachable in my opinion... they should be reachable,”* and P8_If expressed: *“... several of them are so vague and so philosophically questionable as to like OK, but what does it mean?”* Participant P7_If mentioned concerns about greenwashing and distorted metrics: *“They are very important... but they are very easy to be distorted,”* while also emphasizing their added value: *“They can be a good guideline for companies and people to follow to become more sustainable socially, environmentally, and economically at the same time.”* These findings are consistent with previous research referring to the SDG agenda as inconsistent and imperfect (Spaiser et al., 2017).

Next, participants were provided with a link to the official information about the Sustainable Development Goals (SDGs) agenda. They had some time to familiarize themselves with the goals and then were asked another set of questions. The topics that surprised the participants the most were related mainly to the economic dimension of sustainability, such as Economic Growth, Industry, Innovation, and Infrastructure or Affordable and Clean Energy, followed by topics related to social sustainability –

Peace, justice, and Strong Institutions, Health Care, Reduced inequalities, or Partnerships.

The perspectives on how the SDG agenda affects the participants personally varied. Some participants considered the goals to be impacting their lives directly, while some perceived them from a broader societal level. For example, P4_Ff highlighted the potential impact on their daily life: *“Maybe through grocery shopping, at least if talking about... climate actions, some things might become unavailable or limited... most of this has more effect on other countries than Europe.”* Participant P10_If discussed how the goal Sustainable Cities and Communities resonated with their experience: *“Tampere is like a good example... they do many things in Tampere to make it nice and safe... I feel like it affects me in a good way.”* On the other hand, P2_Ff mentioned: *“Different organizations, associations, well just frameworks in general try to focus on these goals,”* further adding: *“I don't think they have direct impact on me but ... these organizations that I'm in a way part of, they have their own goals ... and then indirectly they might impact me.”*

Two participants stated that they do not think the goals affect them. For example, P8_If mentioned: *“I actually feel very removed from several of them because ... from where I come from and the political situation ... goes directly against several of these,”* or P3_Fm explained: *“I don't necessarily see them affecting at least right now... I look at those things and I think yes, please help people who need it here we don't need that much help at the moment.”*

Several participants highlighted the responsibility of individuals to take these goals into account and make choices aligned with sustainable development:

P5_Ff: *“I think everyone needs to take into account like what choices they make to promote these goals.”*

P7_If: *“I think we should really take them into account in every our decision and action.”*

P9_Im: *“This is a way how to lead a sustainable living.”*

Various goals were mentioned when asked which goals the participants could take action for. The most common goals were Climate Action, Gender Equality, and Reduced Inequalities, followed by Quality Education, and Sustainable Consumption and

Production. Goal 13: Climate Action was the most common answer, mentioned by six participants, naming actions from changing daily routines to raising awareness among their peers. For example, P2_Ff stated: *“I’m active in associations, and in these associations, if you wanna do a project, you can try to raise awareness on climate issues or make people think about the issue in different ways,”* or participant P8_If mentioned: *“The climate action with actions every day. Because as I said, they are kind of little like changing food habits, but if you talk to your friends and people the word will spread and I think that we really need to almost delete meat from our diet.”*

Many participants mentioned Reduced Inequalities and Gender Equality both in relation to personal interaction and future professional careers emphasizing the importance of an inclusive work environment and the need to challenge societal norms that perpetuate gender disparities. For example, P7_If mentioned: *“I would say gender equality because if I will ever manage to get a high position that would be my desire, so improve the work environment for both sexes.”*

Goal Responsible Production and Consumption was mentioned as many times as Quality Education. While participant P8_If stated: *“I think I could have impact on responsible consumption and production, for sure,”* participant P3_Ff mentioned: *“... the production part of the goal, I cannot, I don't feel like I can very much influence or take action on but the consumption part, yes,”* indicating that participants tried to really envision their potential direct impact. Climate Action was often mentioned together with Responsible Production and Consumption, reflecting participants’ perception of interconnectedness between environmental sustainability and responsible consumption habits.

No Hunger, End Poverty, or Life below Water were often claimed as goals that participants have no or little influence on, indicating that participants had difficulty identifying personal connections to these goals. However, many mentioned financial contributions as a possible tangible action they could take. P9_Im stated: *“The only way how I can personally do something about them would be to donate to certain charities,”* later adding: *“However, not all of them I necessarily trust with my money... I could probably start doing more research and find myself an organization that is trying to help with poverty, but I need to find a trustworthy one.”* P9_Im was not the only one with a critical approach to donations. P8_If mentioned: *“... clean water, zero hunger, poverty – well, that is something that usually gets presented for like package as*

something that can be dealt with money, which is not true,” continuing: “but that’s usually how people can contribute to any of these issues.”

4.3 Engagement in sustainability among university students

The third concept that emerged from the literature review (Carbach & Fischer, 2017; Murray, 2018; Shoeps & Hemmer, 2017) is Engagement in sustainability among university students, including their preference in engagement. The concept was explored through four parts during the interview: (1) how participants engage in sustainability and (2) how important it is to report sustainability actions and their opinions on the Sustainable Development Report of Tampere University. Next, preference in engagement was explored through: (3) how would participants like to engage in sustainability at the university and (4) what is the best and preferred way to report sustainability actions, which helped determine, how the university can increase student engagement in sustainability.

Firstly, the participants were asked to describe in what ways they engage in sustainability. Several key themes emerged and while environmental aspects were the most prevalent, some participants demonstrated engagement within social dimensions. Various participants described their engagement in sustainability through their daily actions and lifestyle choices. These included for instance dietary choices:

P4_Ff: *“I eat mostly vegetarian and vegan foods. Um, I try to eat fish only like from the lakes...”*

P5_Ff: *“I’ve been vegetarian for like 7 years, so I hope that that reduces my like carbon footprint.”*

P7_If: *“I start[ed] to reduce meat. And also dairy products because I think that those are bad industry.”*

P10_If: *“... not eating meat so much...”* or P3_Fm: *“... eating less meat...”*

Another theme that emerged was transportation habits like using public transport, walking, cycling, or a choice to not own a car. For instance, P8_If stated: *“I take public transport by necessity. I usually walk places.”* Similarly, P5_Ff mentioned: *“I always take public transport when I can.”* or *“I don’t own a car. I don’t really drive a car. I walk and use my bike and usually take public transportation,”* mentioned by P3_Fm.

Notably, several participants emphasized the importance of making informed choices when purchasing products, opting for sustainable and local options. P6_Im mentioned: *"I just really make sure that it's sustainable like the way it's made but also for me that I can use it as long as I want or as long as possible basically."* Similarly, P2_Ff explained: *"As a consumer, I try to buy products I think about it at least to some degree that am I consuming in a sustainable way."* P7_If mentioned the importance of finding sustainable alternatives and the potential impact of such choices: *"I stopped using pads for period now I'm using the menstrual cup and I think this is also something very, very important if each woman would do that."* Various participants mentioned second-hand shopping as a sustainable choice when it comes to fashion or home décor:

F5_Ff: *"I buy second-hand as much as possible."*

P7_If: *"I discovered the world of second hand and at the same time, I discovered like how impactful negatively impactful is the industry of fashion."*

P8_If: *"I don't really buy anything that is fast fashion."*

P10_If: *"I go to second-hand stores,"* or P4_Ff: *"I use recycled furniture and clothes."*

Another notable theme that emerged from the analysis was self-awareness and accountability around wasteful behaviors, especially in case of water or electricity usage. For example, P8_If stated: *"I'm not that conscious about water and light, which I should be, but I try to. Or electricity. I'm very bad with electricity."* Similarly, P9_Im mentioned: *"... trying to not waste water, not waste electricity,"* or P10_If explained: *"I feel like it's like such small things like putting out the light when I'm not in the room...,"* adding: *"it's really difficult for me to not shower too long because I love the shower. But I tried to think ... I need to go out of the shower because it's also taking so much electricity to warm up the shower."*

When it comes to the social dimension of sustainability, themes like academic pursuits, advocacy for gender equality and inclusion, or community outreach and engagement. Several participants highlighted their choice of education related to sustainability. For instance, P2_Ff stated: *"My biggest engagement is studying something just sustainability-related, because then that will most likely take me in my future work life also to contribute in some aspect of you know, like having a job that*

somehow tries to solve these too.” Similarly, P7_If noted: *“I choose to study in the area of sustainable business management, so that was my real first choice regarding sustainability.”* P5_Ff also mentioned education, however as part of her advocacy work: *“I actually work for [company name] and I go to schools and I tell them about, like, their rights about like schooling and water usage and stuff. So, I hope that that also promotes children's understanding as well.”*

Another notable theme emerging from the interviews was community outreach and engagement, especially within student associations. For example, P1_Fm stated: *“I'm pretty active in association part of the studies I would say that for example gender equality is something that I have to also discuss and take into account regarding the actions and events that we produce.”* As well as P2_Ff mentioned: *“I'm active in associations and in these are associations if you do wanna do a project you can direct like try to somehow raise awareness on the issue or make people think about the issue in different ways.”* P6_Im explained: *“I organize events for the Erasmus Student Network and I'm always checking that they are increasingly like inclusive,”* adding: *“I make sure that no one feels excluded, and we also have events like, especially for people to be included.”*

Next, participants were asked about their engagement in sustainability digitally or through digital means. While participants demonstrated some level of digital engagement, in both passive and active ways, there were instances of limited awareness or active participation in digital sustainability initiatives. For instance, P1_Fm questioned: *“I'm not that aware about sustainability regarding digital means,”* or P8_If stated: *“...digital can be kind of hard to conceptualize in my head. Yeah, like how would you frame like, even conceptualize digital sustainability?”* These challenges in conceptualizing digital sustainability may reflect the need for a revised sustainability definition, where the digital aspect is missing in previous publications.

Several participants mentioned passive consumption of sustainability-related content through various social media or streaming platforms. For instance, P8_If mentioned: *“... consuming media on YouTube when it comes to sustainability or on some streaming platforms,”* while P9_Im noted: *“I do get quite a lot of sustainability-related ideas how to, for example, improve your living so that it is more sustainable from general social media, Facebook, Instagram....”* Participant P2_Ff addressed the lack of

active participation: *"I don't per se... produce any of that information for others,"* or P5_Ff similarly stated: *"I wouldn't say that I engage in it super actively."*

Some participants demonstrated active engagement by actively seeking sustainability-related information online or completing online sustainability courses. It is noteworthy that some had a different understanding of digital sustainability, pointing out for example not upgrading their mobile phone, reducing their printing, or working remote. For instance, P7_If stated: *"I stopped printing. I start to try not to print anything anymore,"* adding: *"Then everything I can do, I can do it online."* This demonstrates the complexity of the sustainability concept and its general interconnectedness.

The interviews revealed that most participants do not engage with sustainability through the digital platforms of the university or lack awareness of their use in such a context. Some participants mentioned occasional exposure to sustainability-related contexts through the university newsletter or via coursework on Moodle. This indicated that there is potential for universities to enhance communication and accessibility of sustainability-related initiatives.

Next, the participants' perception of reporting was explored. The participants unanimously highlighted the importance and positive impact of reporting sustainability actions. The participants perceived reporting practices as a means to compare performance, track progress, and encourage sustainable practices.

Some participants recognized the importance of reporting data for decision-making and self-assessment. For example, participant P1_Fm mentioned: *"Reporting is useful because it points out the way we are going and how we are developing,"* while participant P2_Ff explained: *"Without reporting, we don't get the data and data is just to have the information on what is being done or how people are reading these things forward,"* adding: *"it can also be a tool for self-reflection."* P6_Im also emphasized the impact on the decision-making of individuals: *"It forces them to think about all their actions. First, themselves, they see what they are doing. And then for people on the other side, whatever it is [companies] report, they can make decisions based on that."* P8_If explained: *"I think it's good for first of all assess the performance in the environmental performance of a company,"* later adding: *"then I would say that it can*

be a starting point for the company to improve because if you don't assess yourself, you cannot of course improve."

The next theme was knowledge sharing and benchmarking through the reporting practice:

P1_Fm: *"It is good for comparing companies and countries between each other."*

P4_Ff: *"It shares knowledge. People who don't know about things, it tells them."*

P7_If: *" It can be helpful as a benchmark between companies ... and a starting point to improve."*

P9_Im: *"Through the reports, we can see some sort of results... you have to show people somehow that what they do makes a difference, even though it may be only on paper and even though it may be only a drop in a sea."*

Another visible theme that emerged was the accountability and transparency that reporting brings. As P5_Ff emphasized: *"It holds [companies] accountable because if they have to report it, they have to show that they are actually doing something,"* later adding: *"People should be held accountable, and reporting allows us to see what organizations are trying to do."* Participant P3_Fm also expressed his opinion on transparency: *"People need to be able to know what's going on."*

Participants also recognized the positive impact of reporting on creating awareness and fostering behavioral change:

P1_Fm: *"It is good for ... enforcing sustainability in a way."*

P9_Im: *"It's also good for not only informing the open, maybe also ... spurring people on to take part in whatever initiatives might be happening ... This is especially relevant to universities because there is such a wealth of young people who are potentially very active and proactive in a lot of communities."*

P9_Im: *" This is exactly the reason why we need more reporting because otherwise people will just stop doing their part and then it will become even harder for everyone else."*

P10_If: *"It's really important to you because then you can create awareness under other people, and then they are like maybe I should do it."*

Next, participants were asked about the Sustainable Development Report of Tampere University. It is noteworthy that none of the participants knew about the existence of the report. After providing them with a link, they were asked a set of questions.

Overall, participants had mixed views on the Sustainable Development Report. Most participants found the report interesting, either for the content or because they previously did not know about the existence of the report. For instance, P6_Im questioned, *"I just wonder why I have never seen it... When was this published?"* Participant P10_If acknowledged, *"I think it's really interesting because... I didn't know about this report."* P7_If raised a concern about the overall accessibility and lack of communication of the report: *"I think I never received any newsletter or precise e-mail about the sustainable development actions that Tampere University is making towards sustainability, and I am pretty sure that a lot of people didn't."* This highlights the lack of awareness about the report, as well as sustainability actions overall.

While some expressed their positive views regarding the informativeness and extent of the report, some raised concerns about information overload, usability, and accessibility. For instance, P5_Ff commended, *"I like that they really explain like why they've done, how they've done it, and that whenever they talk about like their principles or their sustainable choices."* Participant P8_If stated, *"I actually like this quite a lot, especially with the organization and how many links there are directly and visually separated."*

On the other hand, P6_Im expressed frustration with information overload: *"I see just a long wall of text which I'm definitely not reading because I have better things to do in my life than to read through thousands and thousands of words to learn about sustainability."* Participant P3_Fm expressed similar sentiments, stating, *"There's a lot of information ... a lot of text. There's just so much information there that you'd really have to go through it. I mean, put a lot of time so I don't just skim through. I wasn't really able to get a lot out of it,"* adding *"if you want someone to understand it quickly, then you should maybe create a summary."* Participant P8_If suggested: *"I wonder if there's a way to break this up so it isn't this long and it's more easily digestible."*

P1_Fm called for improved organization of text and accessibility: *"...the home page is just some text about the introduction for that. And not probably that intuitive to*

use," as well as *"there should probably be some like divide between the matters"*. P9_Im echoes these sentiments, critiquing the report for its lack of immediate accessibility: *"It leads to Excel which I have to download which doesn't even open. So, that's my quick experience of the Tampere University sustainable development report for 2020. It didn't report me anything."*

Participants offered constructive suggestions for changes in the report to enhance its accessibility and content. For example, participant P2_Ff recommended, *"I was expecting a PDF. It's a bit surprising to me that it's in links."* P4_Ff said: *"More text on the page and fewer links."* Additionally, participant P9_Im explained the importance of easily accessible information: *"If it's more than six clicks away, then it's too far away and nobody will ever reach it. So the quicker I can get to the information in one side or get information in one place the better for me."*

Visual content and interpretation emerged as a recurring suggestion for a better understanding of the content and overall appeal. For instance, P6_Im stated: *"I think it would be maybe nice if it's a bit more visual... Or maybe there could also be a short video,"* explaining: *"I'm a person who usually would like to see really visual stuff. More interactive."* Similarly, P5_Ff said: *"I think there could maybe be more like graphs and charts to kind of show stuff."* P9_Im explained: *"I would definitely put there infographics. I think infographics are amazing way how to quickly condense a lot of information into easily understandable and communicable infographic which tells me quick results and can show me whether some project has been a success or failure."*

Several participants underscored the importance of providing actionable information and outcomes within the report:

P7_If: *"Let's say the numbers are missing somehow. So it's hard to be taken seriously if you are not showing some report."*

P9_Im: *"I want to see results. I don't want to see all the sauce around. Because for me, the results are also like an attention high point because the OK here are the results. So now I got already the result of the action and that leads to an interest in me... Because if they first try to explain to me how something was done and then I just have to scroll through a lot of text to actually see some sort of result, I am very discouraged to do that and I will just try and go somewhere else to get the information easier,"* as well as: *"It doesn't show any concrete measures. If I click on sustainable*

development report of Tampere University, I would want to see what is university actually doing in order to be more sustainable.”

Suggestions included highlighting concrete results and suggestions for personal involvement in sustainability efforts:

P10_If: *“Adding like how to get involved, something like that.”*

P9_Im: *“Maybe also some suggestions by the university...I am not a sustainability specialist, so I need someone who is to tell me what am I supposed to do?”*

Despite usability concerns and skepticism, most participants identified benefits associated with the Sustainable Development Report. For many participants, the report is a testament to the university’s sustainability efforts and creates a positive perception:

P6_Im: *“It is nice to know that Tampere University is thinking about this stuff ... It makes sure that the university is actually doing stuff and is actively working... that makes the university a better or nicer place or like institution to be.”*

P7_If: *“It benefited me first of all and being more aware of like how the institution that I'm part of is behaving.”*

P8_If: *“In a very base level like I guess the university is doing good. I'm not at that bad of an institution like might be worse like at least take care.”*

Participants also mentioned the report’s potential to inspire action and create opportunities for engagement. For instance, P7_If stated: *“It gives me ideas on how in the future other institutions or places where I'll be working can follow the steps...it's a matter of awareness and at the same time also I would say opportunities.”* Additionally, P10_If mentioned the potential for collaboration: *“We could collaborate as an organization but also individually.”* This suggests that the report could serve as a catalyst for broader engagement with sustainability initiatives.

Some participants also expressed skepticism toward the benefits of the report, including a lack of transparency or a lack of overall trust in the institution. P9_Im explained: *“I don't think it really benefits me at all, mostly because the first thing I am trying to do is to scroll through some and I wanna say actual information. What I mean is more tangible results and achievements.”* Participant P3_Fm noted: *“I'd say if I trust*

the institution, then it would help. But like with the University of Tampere, I'm maybe a little skeptic myself. Are you guys really doing all of this or does this actually have an impact on sustainability?" or *"If I'd see something like that on the university website, I'd have sort of a hard time believing it, like I wouldn't know how much of it is just sort of the positive PR."* This suggests a need for clearer communication and evidence of the university's sustainability efforts.

Lastly, most participants acknowledged the potential impact of peer recognition in the report on their own engagement in sustainability action which highlights the importance of representation and social influence. For instance, P4_Ff stated: *"I would think yes. I would feel a bit ashamed if all of my friends were to report, but I wouldn't. I would be encouraged to post also because all of my friends do."* Similarly, P10_If explained: *"Yeah, because when I would know [a peer mentioned in the report], I will text him and ask what he's doing and maybe I could also do something together with him on the project."* P3_Fm said: *"I think it would have at least a positive impact on my attitude, which would then most likely lead to actually taking action and doing something."* This suggests that peer recognition may play a role in motivating individuals to engage with sustainability initiatives.

4.3.1 Preference in engagement

Various themes regarding preference in engagement emerged during the interviews. Several participants expressed a desire to actively participate in sustainability-related projects within the university community. For instance, P2_Ff emphasized the benefits of student engagement in research projects: *"I think students could be more engaged in different [research] projects."* Similarly, P5_Ff mentioned participation in university-organized sustainability events: *"...climate action days where I could physically participate or some kind of Environment Days. I think I would participate on those. Maybe share some fliers or give people candy to donate."* P9_Im also expressed a desire for university-organized projects: *"If there were some sustainability projects organized by the university where students could participate,"* further adding: *"I would be very strongly incentivized to participate in some projects like that...if I were able to get credits from it."* This indicates that receiving academic credits could be a motivating factor for student engagement.

Some participants emphasized the importance of community engagement when it comes to sustainability initiatives. As P1_Fm explained: “... *some events with collaboration with student associations because those are the ways that students can be invited better. Because university creating some events and inviting people does not work. People don't necessarily interest in university events on their own but rather focus on the events for their own associations.*” P5_Ff mentioned student association as well: “*It would be nice if there was like a like a group specifically for that the same way as they have like all these student associations,*” adding: “*it would be cool if they had like a sustainability one...people could come together to meet and like, come up with ideas as how to improve things or how to campaign like the university to change stuff.*” Additionally, P8_If stated: “...*protests and such that's a really nice engagement,*” further explaining: “*if there are things like clothing swaps or some events that try to foster specific communities.*” This may indicate that community-building activities and some platform for collective action may be drivers of student engagement in sustainability.

Another theme that emerged was related to a change within the university as a decision-making power and a key player in influencing a change. P7_If advocated for decentralizing decision-making and involving students in the process, suggesting that greater student involvement could lead to more effective and sustainable outcomes: “*The decisions are made on top and then students aren't really heard. Just being able to make a difference and not have everything just decided from the top I would say that would be a very healthy change.*” P7_If suggested removing meat from the menu as a symbolic gesture that would make a statement: “*They should delete meat from the menu because I think this is a significant step and that doesn't mean that people cannot buy meat, they can eat meat, but I think that if University is telling you I'm not giving you this also because it's bad for health generally...this can be something important, something symbolic.*”

Lastly, effective communication emerged as a significant factor in influencing student engagement in sustainability efforts. Several participants called for better communication and increased visibility of sustainability initiatives within the university community. For instance, P4_Ff stated: “*The communication could be somehow better because I'm seeing now this report that I wish that I would have stumbled upon earlier.*”

P7_If emphasized the importance of promoting sustainability-related initiatives through widely accessible channels such as the university's intranet: *“They should make sustainability initiatives and the website more famous because I think I did never receive that,”* adding: *“Students go often on Intranet. Why don't they put some kind of stuff about sustainability more often in the Intranet? I think that some more visibility is needed to make the students in general more engaged.”* Additionally, P10_If highlighted the effectiveness of email communication in reaching students, indicating a willingness to engage if adequately informed about opportunities: *“They could e-mail everyone because that's the main way to reach me...I wouldn't delete something like „would you want to get involved in sustainability projects?“”*

Participants offered various suggestions for enhancing engagement in sustainability at the university through digital means. One of the main themes that emerged was the effective use of communication channels. Many emphasized the potential of existing digital communication channels, such as social media, the Intranet newsletter and portal, as well as direct emails from teachers. P2_Ff highlighted: *“...somehow as social media is becoming so big, I hope that the university also does more with that.”* Similarly, P6_Im suggested: *“I think it would be nice if they shared more about their actions on social media. So, for example, on Instagram, to see more posts about what they've been doing or projects or ideas would be nice.”* P9_Im also called for a sustainability newsletter as well as called for a more effective use of social media platforms by the university: *“They could try to create [a newsletter]”* adding: *“...university should start using social platforms better... an Instagram story or Facebook story or post or Twitter.”*

Participants also emphasized the importance of transparency and an inclusive approach across departments to encourage broad student engagement in sustainability. P5_Ff suggested: *“Sustainability is very interdisciplinary, so making it specifically for one department is really reductive and almost like harming the potential result of it. So I would say not differentiating too much between the department so involving just as many students possible.”* P2_Ff highlighted the importance information being up to date: *“that the digital information is up to date in forms of the website and newsletters and so on.”*

A few participants suggested that direct emails could be a more effective way to communicate sustainability-related initiatives rather than through the Intranet, as it

creates a sense of urgency. P7_If explained: *“If you get like the direct e-mail, I think it feels more like we need you, you should do that. Intranet is more like communication at the general level like there is this and you choose whatever but getting like direct e-mail I think it would be a more incentivizing.”* Similarly, P4_Ff suggested that teachers share more information directly, pointing out the ineffectiveness of Intranet: *“...teachers could share more information about those things or email. Because I think people don't read the Intranet that much.”*

Several participants called specific types of sustainability-related content from the university. P9_Im highlighted the effectiveness of practical and easily understandable information: *“They could give people ideas, give them guidelines and frameworks, how to lead a more sustainable life, and what each individual can do to help with achieving these goals,”* adding: *“give me some specific actions that I can take and put them into short PowerPoint or few posts on Instagram where I can very quickly learn - this is a specific thing that you can do in order to be more sustainable.”* P8_If suggested information about petitions or sustainability-related webinars: *“...pushing for stuff like petitions which is a very easy way to feel like a digital activist. And I also enjoyed when there were webinars available.”* These findings underscore the significance of leveraging digital platforms effectively to promote sustainability engagement within the university community.

Lastly, the preferred way to report sustainability actions among participants was explored. Several participants suggested an online form or a website, emphasizing its simplicity:

P1_Im: *“...maybe some web page or some form...”*

P2_Ff suggested: *“Through the Internet or website... I don't think it should be anything more special than that.”*

P5_Ff: *“...a multiple-choice form or something where you can write a description....”*

P6_Im: *“Through a form. And then they can always ask more...”*

P9_Im: *“Probably through a relatively simple questionnaire...”*

P7_If suggested: *“questionnaire could be good,”* later emphasizing its efficiency and time considerations: *“with the premise that it wouldn't be anything super long*

super time-consuming. Little interviews, but yeah, actually surveys are faster or small reports.”

Overall, participants prefer simple and convenient methods of reporting, emphasizing transparency and efficiency.

5 DISCUSSION

The main question that this study aims to answer is how student engagement in sustainability can be enhanced by digital means. In this chapter, the main findings are presented in line with the conceptual framework outlined in Chapter 2.

5.1 Digital Means and Accessibility

Previous research highlights the crucial role of accessibility in providing equal and equitable opportunities for student engagement and in the context of this study student engagement in sustainability initiatives. The COVID-19 pandemic rapidly boosted the digital shift, further advancing a new era where universities increasingly rely on digital tools to educate, communicate, and interact with students. (Haleem et al., 2022; Máñez-Carvajal et al., 2021). However, despite the large spread of digital platforms and tools, research has highlighted deficiencies in their accessibility aspects, posing significant barriers to inclusive student engagement (Máñez-Carvajal et al., 2021; Ismail et al., 2020).

The findings of this study support previous research (Haleem et al., 2022; Máñez-Carvajal et al., 2021) and indicate that the university digital platforms serve as an essential digital tool for engagement, communication, and information sharing, however, also echoing concerns raised in prior research (Máñez-Carvajal et al., 2021; Ismail et al., 2020), many gaps in accessibility, usability, and design were identified. Participants highlighted navigation difficulties and challenges in accessing relevant information, indicating significant barriers to engagement.

The observed patterns of participants' use of digital platforms offer a detailed insight into the relationship between digital accessibility and student engagement. While email and Moodle were considered as main communications channels, the Intranet newsletter emerged as the most useful for accessing information about university events, activities, and initiatives. However, participants rely on email and external sources for information retrieval, indicating a potential disconnect between usage patterns and platform accessibility. The observed reluctance to engage with university platforms (Intranet, official website) directly due to accessibility concerns is in line with previous research (e.g., Máñez-Carvajal et al., 2021), suggesting that universities encounter difficulties in meeting accessibility standards and that greater effort must be made to achieve better quality and user-friendly access to content. This highlights the

need for intervention to improve the usability and navigation features of these digital tools and potential means of student engagement in sustainability initiatives.

The findings also shed light on factors influencing student participation in questionnaires and forms. According to the participants, to make questionnaires more enjoyable to fill, the questionnaires should be short with a clear structure and simple language, have mainly multiple-choice answers, and include pictures or a better visual design. All these suggestions align with accessible universal design principles and previous research highlighting its importance (CUED, n.d.; Cifuentes et al., 2016). Furthermore, participants' willingness to engage with questionnaires aligned with their perceived relevance to their student life and impact on future students, highlighting the importance of conveying the significance and purpose of different initiatives.

Incorporating the participants' suggestions for improving accessibility of university platforms, such as optimization of the search function, consolidation of platforms for clarity and ease of access, or overall better communication strategies can contribute to a more accessible digital environment and potentially positively impact student engagement at the university. These recommendations highlight the importance of prioritizing user-centric universal design principles and communication efforts to mitigate accessibility barriers, previously also mentioned by Cifuentes et al. (2016).

5.2 Sustainability understanding

In literature, sustainability is defined as a multidimensional concept, encompassing environmental, social, and economic aspects (Elkington, 1999; Kajikawa, 2008; Schoolman et al., 2012). However, previous research shows a predominant focus on the environmental aspect (e.g., Murray, 2018; Palacká et al, 2021; Alexander et al., 2022; García-González et al., 2020) and highlights the prevalent emphasis on the environmental dimension of sustainability among students, with limited consideration for social and economic aspects of the concept.

The findings of this study reveal a similar trend, where participants demonstrated an inclination towards environmental sustainability. The environmental aspect of sustainability was mentioned by eight participants, some emphasizing that the environmental aspect of sustainability is the first thing that comes to mind. This echoes previous research by García-González, Jiménez-Fontana & Goded (2020) who found that students often possess a surface-level perception of sustainability, focusing

primarily on environmental concerns while overlooking social and economic dimensions. The alignment between previous research and the findings of this study underscored the persistence of the environmental dimension as a central theme in sustainability understanding, suggesting the need for education and awareness regarding other aspects of sustainability and its multidimensionality. By fostering a deeper understanding of sustainability in all its dimensions, universities can further improve student engagement in sustainable initiatives. This also aligns with Maiorescu et al. (2020) who concluded that a significant factor leading to low involvement of students is the lack of sustainability-oriented education within the institution, both at the theoretical and practical level.

Despite the prevalence of the environmental aspect among participants' perception of sustainability, some participants did recognize social and economic dimensions and acknowledged the interconnectedness of sustainability across various aspects of their everyday lives, including transportation, diet, consumption habits, or responsible financial practices. This observation aligns with the broader understanding of sustainability as a lifestyle characterized by responsible choices and a balance between the planet, people, and profits (Elkington, 1999; Kajikawa, 2008; Schoolman et al., 2012).

Regarding participants' knowledge of the SDGs, the findings show varying levels of awareness and understanding. While some demonstrated comprehensive knowledge of the agenda goals, others showed limited awareness, particularly regarding the economic aspect of sustainability. Furthermore, participants demonstrated differing views on the SDGs, ranging from optimism to skepticism. While some expressed confidence in the potential to drive positive change with these goals, some raised concerns about their effectiveness, echoing previous critiques of the SDG agenda (e.g., Spaiser et al., 2017). Despite these differences, there was a consensus among participants regarding the importance of collective and individual action in driving positive change, emphasizing the role of responsible behavior and informed decision-making.

Notably, considering the increasing impact of digital technologies in education and the great potential to drive change within sustainability initiatives (Bohnsack et al., 2021, Haleem et al., 2022; Máñez-Carvajal et al., 2021), the findings suggest a crucial gap in participants' perception of digital dimension within the concept. While only one

participant mentioned the digital dimension, some demonstrated challenges in understanding the concept. For example, P8_If stated: “...*digital can be kind of hard to conceptualize in my head... how would you frame, even conceptualize digital sustainability?*” This aligns with Seele & Lock (2017) who concluded that research on the digital aspect of sustainability is still in the early stages on many levels, as well as highlights the need to redefine sustainability within the concept of the digital era suggested by Palacká et al. (2021).

Overall, participants demonstrated differences in their understanding of sustainability. The variations can be seen in terms of depth of knowledge, focus, and consideration of different dimensions of sustainability. These nuances can be attributed to the different backgrounds and experiences of the participants. Such diversity contributes to the complexity and multidimensionality of sustainability as a concept. It is noteworthy that individual interpretations of sustainability can significantly influence campus sustainability culture (Alexander et al., 2022), underlining the importance of exploring diverse perspectives and comprehensive understandings within higher education institutions.

The convergence between the findings of this study and previous research highlights the multidimensional nature of sustainability and the importance of addressing the gaps in sustainability education. It becomes apparent that fostering a comprehensive and holistic understanding of sustainability among students is essential for promoting meaningful engagement in sustainability initiatives. By addressing the predominant focus on environmental sustainability, integrating digital literacy, and promoting holistic sustainability education, universities can foster a more nuanced understanding among students, and ultimately promote active engagement in sustainable practices and initiatives.

5.3 Engagement in sustainability among university students

Universities have been recognized as key drivers of the transition to sustainable societies, however, student engagement in sustainability remains understudied in recent literature (Murray, 2018). The study at hand reveals that university students engage in sustainability through various daily actions and lifestyle choices, primarily within the environmental aspects but also extending to social dimensions. They engage through dietary choices, transportation habits, conscious purchasing decisions, and self-

awareness regarding wasteful behaviors. Furthermore, participants emphasized the importance of making informed choices as part of sustainability engagement, such as using public transport, opting for vegetarian/vegan diets, buying local and sustainable products, as well as shopping second-hand.

Notably, participants demonstrated engagement within the social aspect of sustainability, such as through their choice of sustainability-related academic pursuits, advocacy for inclusion and gender equality, and community outreach. Various participants highlighted their engagement within student organizations or associations, emphasizing their involvement in advocating for gender equality, quality education, and inclusion. This finding confirms the notion that students are actively involved in enhancing the uptake of sustainability in higher education through multi-stakeholder collaborations, and collective action (Murray, 2018). While Murray (2018) indicates the lack of intersectionality, this study contradicts his findings and shows that students demonstrate consideration for intertwined social and environmental aspects.

Participants of this study demonstrated varying levels of digital engagement, particularly passive consumption of sustainability-related content on social media platforms. However, the awareness of digital aspects and active use of digital means in sustainability initiatives was limited. This finding is in line with previous literature which concludes that research on the digital aspect of sustainability is still in the early stages on many levels (Seele & Lock, 2017), and rethinking the sustainability concept within the digital context is needed (Palacká et al., 2021). The limited consideration and awareness of sustainability engagement through digital means highlight a potential area for further research.

Previous research suggests that sustainability reporting at schools can contribute to increased student participation in sustainability activities (Carbach & Fischer, 2017) and highlights the benefits of student participation in thereof (Shoeps & Hemmer, 2017). The findings of this study align with previous studies as participants unanimously recognize the importance and positive impact of reporting sustainability actions. Reporting is seen as a tool for self-assessment, benchmarking, accountability, and transparency, as well as a means of creating awareness and fostering sustainable practices within the university community. In the case of the Sustainable Development Report of Tampere University, participants expressed mixed views. While some found it informative, others raised concerns about usability, accessibility, and information

overload. Furthermore, none of the participants were aware of the report before the interviews, suggesting a crucial gap in communication and visibility of this initiative from the university, echoing findings from previous research suggesting that lack of accessibility can hinder student engagement (Máñez-Carvajal et al., 2021; Ismail et al, 2020). Notably, participants emphasized the report's potential to inspire action and create opportunities for engagement, aligning with previous research by Carbach & Fischer (2017) suggesting that reporting can contribute to increased student participation in sustainability activities.

The findings of this study also shed light on the preferred way of engagement and suggestions for enhancing student engagement in sustainability within the university community. Echoing previous research (Murray, 2018) participants of this study expressed keen interest in actively engaging in sustainability-related initiatives within the university community. These included, for example, collaboration in research projects, sustainability-themed events, and vegetarian/vegan meals at the campus. The participants also highlighted the importance of community engagement, collaboration between different departments and study fields, and inclusivity in fostering student participation in sustainability initiatives. When it comes to reporting, participants preferred simple and convenient methods such as online forms or questionnaires, emphasizing transparency and efficiency.

Effective communication emerged as a significant factor in influencing student engagement. Participants called for better communication and increased visibility of sustainability initiatives within the university community through various digital channels, highlighting the importance of direct communication via email. They also called for more transparency to enhance student engagement, supporting previous research by Shoeps & Hemmer (2017) who suggested that students must be aware of what they can expect from actively participating, to ensure their involvement.

Overall, the findings of this study align with previous research and show that university students actively engage in sustainability through various daily actions, academic pursuits, conscious behavior, and community engagement. However, there is a need for improved communication, transparency, and accessibility of sustainability initiatives within the university community. By addressing these challenges, universities can foster a deeper understanding and awareness of sustainability and enhance student engagement in sustainability efforts within their community.

6 EVALUATION AND ETHICAL ASPECTS OF THE STUDY

In this chapter, the trustworthiness and ethical aspects of the study are discussed. According to Cypress (2017), researchers must ensure validity and rigor throughout the entire research process, rather than evaluate these aspects retrospectively. Drawing on Cypress's perspective, the author of this study aimed to ensure rigor in all phases of the research process, from literature review to data analysis and reporting.

6.1 Trustworthiness of the research

As the topic of this study is emerging, the literature review was written with an integrative review approach, which has allowed for a more creative and flexible approach to collecting literature. The literature review process was built on Snyder's notion of the aim not being to cover all literature ever published but rather assess, critique, and combine insights and perspectives from different fields to enable new perspectives to emerge. (Snyder, 2017) Peer-reviewed scientific articles and reputable online databases were used to ensure the credibility and reliability of the literature review. While the review process was not systematic in nature, the author aimed to include key discussions surrounding student engagement in sustainability through digital means.

Validity ensures that the study is accurate and valid tools and methods were employed to accurately measure what needs to be measured (Cypress, 2017). Validity in this study was emphasized through the data collection process. The choice of qualitative methodology, interpretivist approach, and semi-structured interviews was carefully justified to align with the research objectives. The explanation and justification are described in more detail in Chapter 3. Measures were taken to ensure the authenticity, diversity, and robustness of the data. A purposeful random sampling strategy was used to increase the credibility of the results (Palinkas et al., 2015) and to select a diverse range of university students from distinct academic backgrounds. Schou et al. (2011) indicated that authenticity is shown in the selection of suitable participants and the provision of detailed descriptions, which can be found in Table 3. Selecting equal

representation of Finnish and international students and the gender balance of four men and six women further contributed to the representativeness of the sample.

The data analysis process is described genuinely in Chapter 3 of this thesis. Interview transcripts were analyzed thoroughly multiple times to ensure that the research question of the study was answered within the theoretical framework. While the subjective interpretation of the findings may pose a threat to the validity of the research, the author aimed to maintain an objective approach during the analysis and reporting process. Attention was paid to the clarity and coherence of the writing to accurately convey participants' perspectives and maintain fidelity to their original statements. Furthermore, to ensure that all ideas were interpreted correctly, all answers were analyzed and reported as they were discussed in the interview.

Additionally, other theses were used as inspiration for the structure of the thesis at hand, and artificial intelligence tools such as Grammarly and similar were used to prevent spelling errors and explore alternative ways to articulate ideas. It is crucial to mention that these tools were used solely to enrich the vocabulary and ensure the proper flow of text, and the ideas and research presented in this thesis were produced by the author. The thesis was checked via a plagiarism tool Turnitin OriginalityCheck before it was published.

6.2 Limitations of the study

While this study aimed to provide valuable insights into student engagement in sustainability, it is important to acknowledge limitations that may have impacted the research process and findings.

One of the primary limitations of this study is the relatively small sample size. While the author aimed to ensure diversity of participants by including students from various academic backgrounds and nationalities, the sample size of this study may not fully represent the diverse university student population. A more diverse and larger sample size could have provided a broader range of perspectives and insight into sustainability engagement.

Furthermore, the recruitment of participants relied on convenience and voluntary participation, which may have introduced selection bias. Participants who agreed to participate in this study may have had a strong interest or engagement in sustainability, which could have skewed the findings towards more positive attitudes and behaviors.

Additionally, the recruitment process was online via social media and may have limited the reach to certain demographics, such as those less active on social media platforms.

Additionally, the data collected in this study relied on self-reported information provided by the participants which can introduce social desirability bias which is a tendency to present reality in a way that is perceived as socially acceptable (Bergen & Labonté, 2019). This bias could influence the accuracy and reliability of the data, especially regarding participants' engagement in sustainability.

The digital aspect of sustainability is an emerging concept, and the lack of established definitions and frameworks poses challenges in conceptualizing and using this concept in research. Furthermore, the study primarily focused on students' interactions with digital tools and platforms within the university context. With this approach, the study may have overlooked significant sources of digital engagement and failed to capture a comprehensive understanding of students' digital sustainability behaviors.

Lastly, thematic analysis, as the primary research method in this study, involves the subjective interpretation of data by the researcher. While the author made efforts to ensure rigor and transparency in the analysis process, the subjective nature of qualitative analysis introduces the possibility of researcher bias.

6.3 Ethical consideration

According to the Finnish National Board on Research Integrity TENK (2019), researchers in all disciplines should be guided by general ethical principles that ensure the dignity and autonomy of participants, avoid harm as well as safeguard the privacy and data. Children Online: Research and Evidence CORE (2022) considers reliability, honesty, respect, accountability, and justice as the most important ethical principles and emphasizes the importance of confidentiality, especially in digital research. The researcher of this study followed these principles.

At the beginning of the interview, the researcher made sure that participants were comfortable in the online setting and asked a vocal consent to record. Steps were taken to create a safe and inclusive environment for participants, ensuring their voices were heard and respected. Then, participants were provided with clear information about the purpose of this study and the objective of the interview, as well as reminded again about the voluntary nature of their participation and confidentiality. Additionally, the

participants were made aware that they could withdraw from the interview at any point. Each participant was shown a consent form (Appendix B) and asked for oral consent.

All interviews were conducted using the Microsoft Teams platform and the recorded videos were automatically stored in the Microsoft Stream platform. The author made all recordings private immediately after that. All transcripts were downloaded and stored on the personal computer of the researcher. After the analysis, all recordings were permanently removed from the platform.

The researcher maintained a neutral tone and open view toward participants' perspectives to ensure that none of their knowledge or bias influenced the discussions or participants' opinions. To ensure the anonymity of the participants, they are referred to with specific codes, which are described in detail in Chapter 3 of this thesis (Table 3). Only essential information relevant to the study was disclosed, and participants' privacy was always prioritized. The transcripts were reviewed multiple times during the analysis process and carefully edited to fade any personal information that could help identify the participants. The findings of the research will be made available in Trepo once this thesis is published.

7 CONCLUSION

In a world where sustainability has become imperative for the present and future, the role of universities in driving the transformation toward a sustainable society cannot be overstated. Furthermore, as the digital revolution changed the way we communicate, learn, and work, it is important to explore the full potential of the digital paradigm shift in enhancing student engagement in sustainability.

7.1 Summary

The primary aim of this thesis was to give a better conceptual understanding of sustainability participation by digital means among university students to enhance their engagement. This was achieved through the exploration of existing literature, followed by qualitative interviews with ten Tampere University students. The main research question guiding this study was: How can student engagement in sustainability be enhanced by digital means?

The findings of this study revealed several key insights. Firstly, it was observed that while university digital platforms play a crucial role in engagement, communication, and information sharing, there are significant gaps in usability, accessibility, and design. This finding aligns with previous research. Participants identified challenges with navigation and accessing relevant information. Interestingly, while the Intranet emerged as the most useful university platform for accessing information about university events, activities, and initiatives, participants rely on email and external sources for information retrieval. This indicates a potential disconnect between usage patterns and platform accessibility and highlights a significant barrier to engagement. Suggestions for improvement included streamlining platforms for clarity, optimizing search functionalities, and improving the design of the user interface. Additionally, participants provided valuable feedback on improving the accessibility of questionnaires and forms, emphasizing the importance of simplicity, clarity, and visual design. These insights underscore the importance of user-centric design principles in fostering engagement.

When it comes to sustainability understanding, participants of this study demonstrated varied levels of their understanding. The variations can be seen in terms of depth of knowledge, focus, and consideration of different dimensions of sustainability. The findings showed a predominant focus on the environmental aspect of

sustainability, echoing previous research. However, some participants recognized social and economic dimensions and acknowledged the interconnectedness of sustainability across various aspects of their everyday lives, including transportation, diet, consumption habits, or responsible financial practices. Additionally, the findings suggest a crucial gap in participants' perceptions of the digital dimension of sustainability. While only one participant mentioned the digital dimension, some demonstrated difficulties in conceptualizing digital sustainability. This finding aligns with previous research, highlighting the need for rethinking the sustainability definition in the context of the digital era. The findings of this study highlight the importance of fostering a comprehensive and holistic understanding of sustainability among students to enhance meaningful engagement in sustainability initiatives.

Furthermore, regarding engagement in sustainability among university students, participants demonstrated active engagement through various daily actions, academic pursuits, conscious behavior, and community engagement. Their engagement was primarily within environmental aspects but also extended to social dimensions. Despite some level of passive digital engagement, the awareness of digital aspects and active use of digital means in sustainability initiatives was limited. The findings of this study align with previous studies as participants unanimously recognize the importance and positive impact of reporting sustainability actions. However, in the case of the Sustainable Development Report of Tampere University, some participants raised concerns about usability, accessibility, and information overload. Furthermore, none of the participants knew about the report before the research which indicated a crucial gap in communication and visibility of this initiative from the university. There was a keen interest in actively engaging in sustainability-related initiatives within the university community, and participants emphasized the importance of community engagement, collaboration, and inclusivity in fostering student participation in sustainability initiatives. Effective communication, transparency, and accessibility emerged as crucial factors influencing engagement levels within the university community.

7.2 Implications

This study contributes to the evolving dialogue on sustainability engagement among university students, particularly within the digital context. The findings provide an insight into student understanding of sustainability and their engagement, highlighting

existing gaps in knowledge and practice, therefore creating a foundation for future research in this area.

Based on the findings of this study, here are 5 key suggestions for universities to enhance student engagement in sustainability by digital means:

- 1. Ensure accessibility:** Inaccessible university platforms were identified as a crucial barrier to student engagement in sustainability. Prioritize user-friendly design, clear navigation, and optimized search function to remove barriers to engagement and facilitate easy access to sustainability-related resources.
- 2. Enhance communication strategies:** Tailor communication strategies to meet student preferences for accessing sustainability information. Utilize a variety of digital communication channels, such as email, social media, and newsletters to increase the visibility of sustainability initiatives and opportunities for engagement.
- 3. Ensure holistic sustainability education:** The findings of this study, supported by previous research, highlighted a strong inclination towards narrow sustainability understanding, encompassing primarily the environmental aspect. By fostering a deeper understanding of sustainability in all its dimensions (environmental, social, economic, digital), universities can further improve student engagement in sustainable initiatives.
- 4. Facilitate cross-disciplinary collaboration:** The participants of this study highlighted the importance of community engagement and collaboration between different departments which not only boosts inclusivity in fostering student participation in sustainability initiatives but also promotes a holistic approach to sustainability.
- 5. Ensure user-friendly and transparent reporting systems:** Improve visibility of sustainability reports and provide clear information on goals and outcomes of sustainability reporting, as fostering transparency in reporting nurtures a culture of active engagement. Ensure simplicity and convenience in reporting methods, such as online forms, to encourage student participation.

7.3 Future research

Digital sustainability is an emerging concept, and its research is still in its early stages. Future research could dive deeper into the exploration of the digital aspect of

sustainability and strive for refining the conceptualization of digital sustainability as well as explore further the role of digital means in promoting sustainability engagement among university students.

Regarding the limitations identified in this study, future studies could include a more diverse and representative sample size and employ a more varied recruitment process to mitigate selection bias. Furthermore, innovative data collection techniques could be employed to address social desirability bias.

Comparative studies across different universities and cultural contexts could provide valuable insights into the factors influencing student engagement in sustainability. Additionally, future studies could evaluate the efficacy of interventions suggested in this thesis which aimed at enhancing accessibility and fostering a more comprehensive understanding of sustainability, thereby informing evidence-based practices in higher education settings.

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APPENDIX A: SEMI-STRUCTURED INTERVIEW TEMPLATE

THEMES		MAIN QUESTIONS	SUBTOPICS
Theme 1	DIGITAL MEANS	Which university platforms do you use/visit the most?	<ol style="list-style-type: none"> 1. Which do you find most useful as a communication channel? 2. Which one do you use to find out information? (about events, news, etc.) 3. If you were to share some information with the university, how would you prefer to do it?
		How accessible are, in your opinion, the university websites?	<ol style="list-style-type: none"> 1. Have you ever encountered an issue while browsing for information online? Please describe. 2. Are there any aspects that could be made more accessible?
		What is your experience with online questionnaires and forms?	<ol style="list-style-type: none"> 1. Have you ever decided to skip questions or close the form before finishing it? What are the reasons for you to decide not to finish filling in the form? 2. What features do you think can be added to improve these kinds of questionnaires, to make it more enjoyable to fill? 3. How accessible are these online forms, in your opinion?
Theme 2	SUSTAINABILITY AND ENGAGEMENT	How would you define sustainability? How do you understand	<ol style="list-style-type: none"> 1. What is sustainability to you? To which aspects of life does it refer to? 2. Could you, please, give me some examples of sustainable actions?
		Can you tell me whether and what you know about SDGs of Uni	<ol style="list-style-type: none"> 1. What goals can you name? 2. (if they don't know SDGs): Make a guess for topics that may relate to it.
		Show the respondent SDGs	<p><i>I sent you a link to the SDG official website. When you scroll all the way down, there are the goals with a short description. Please, go through them and let me know when you are ready.</i></p> <ol style="list-style-type: none"> 3. Are there any goals that surprise you? Which are those? 4. How do you think the 17 goals affect you? 5. Which goal or goals you think you would be able to take actions for? Explain.
		How do you yourself engage in sustainability?	<ol style="list-style-type: none"> 3. How do you engage in sustainability digitally? 2. Can you explain why do you not engage in sustainability?
		Which university digital platforms do you use to engage in sustainability topics?	<ol style="list-style-type: none"> 1. How important do you think it is to engage in sustainability?
Theme 3	REPORTING	How important it is, in your opinion, to report sustainability act	<ol style="list-style-type: none"> 1. What do you think it is good for? 2. Why do you think it is not important?
		What is your opinion about the Sustainable Development Repor	<p><i>Inform about the report. /Show them on the website.</i></p> <p><i>This report provides an overview of the wide range of activities and projects that students, teachers, researchers, and support staff of Tampere universit�tes are carrying out to make progress towards sustainability goals.</i></p> <p><i>I sent you a link to it in the chat. Ill give you a few minutes to get familiar with the report. Let me know, when you think you got an idea.</i></p> <ol style="list-style-type: none"> 1. How interesting do you find the report? 2. In which way, if any, do you think the report benefits you? 3. what is something you would change on the report? 4. If you saw one of your fellow classmates mentioned in the report, would that motivate you to take action or report your actions, too?
	BETTER ENGAGEMENT AT THE UNI	In what way would you like to engage in sustainability at the ur	<ol style="list-style-type: none"> 1. How could these things be done by digital means of the university?
		What is, in your opinion, the best way to report your sustainabi	<p><i>If you were to report, how would you like to do it?</i></p>
Theme 5	TESTING THE PROTOTYPE	SEND THE RESPONDENT THE FORM AND EXPLAIN WHAT IT IS FOR	<ol style="list-style-type: none"> 1. What is your opinion about the form? 2. How would you make it better?

APPENDIX B: CONSENT FORM

INFORMED CONSENT FORM

Consent for participation in a research study

I have been requested to participate in the research study identified above. I have received information about the study and have had the opportunity to ask questions from the researcher conducting the study.

I understand that participating in the study is voluntary. I am aware that I have the right to refuse to participate and the right to withdraw from the study permanently or for a temporary period at any time without giving a reason. I understand that any personal data collected in the course of the study will remain confidential.

Do you voluntarily consent to participate in this study?

YES

NO